μA710
HIGH-SPEED DIFFERENTIAL COMPARATOR
FAIRCHILD LINEAR INTEGRATED CIRCUITS

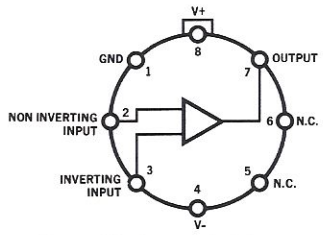
- **IMPROVED SPECIFICATIONS**
- **2 mV MAXIMUM OFFSET VOLTAGE**
- **3 μA MAXIMUM OFFSET CURRENT**
- **1250 MINIMUM VOLTAGE GAIN**
- **10 μV/°C MAXIMUM OFFSET VOLTAGE DRIFT**

GENERAL DESCRIPTION — The μA710 is a differential voltage comparator intended for applications requiring high accuracy and fast response times. It is constructed on a single silicon chip using the Fairchild Planar* epitaxial process. The device is useful as a variable threshold Schmidt trigger, a pulse height discriminator, a voltage comparator in high-speed A-D converters, a memory sense amplifier or a high-noise immunity line receiver. The output of the comparator is compatible with all integrated logic forms.

ABSOLUTE MAXIMUM RATINGS

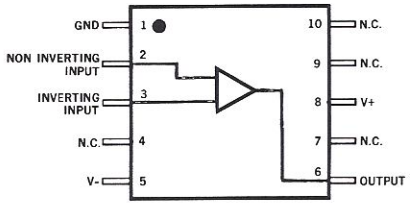
Positive Supply Voltage		+14.0 V
Negative Supply Voltage		−7.0 V
Peak Output Current		10 mA
Differential Input Voltage		±5.0 V
Input Voltage		±7.0 V
Internal Power Dissipation		
TO-99	[Note 1]	300 mW
Flat Package	[Note 2]	200 mW
Operating Temperature Range		−55°C to +125°C
Storage Temperature Range		−65°C to +150°C
Lead Temperature (Soldering, 60 sec.)		300°C

TO-99 CONNECTION DIAGRAM
(TOP VIEW)

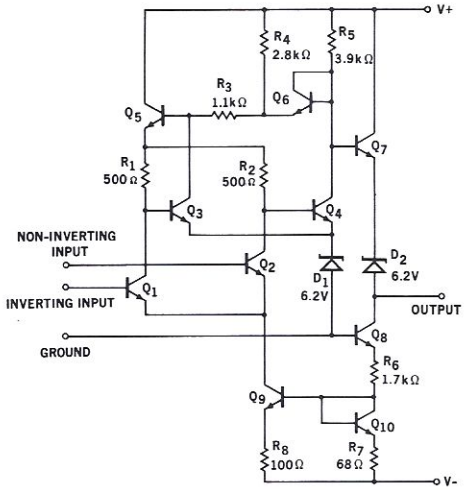


Note: Pin 4 connected to case.

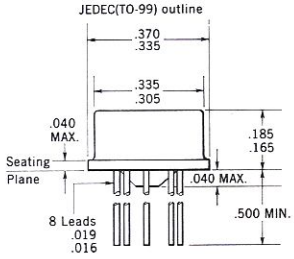
FLAT PACKAGE CONNECTION DIAGRAM
(TOP VIEW)

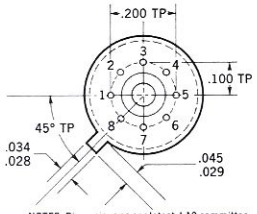


SCHEMATIC DIAGRAM



PHYSICAL DIMENSIONS
in accordance with JEDEC(TO-99) outline

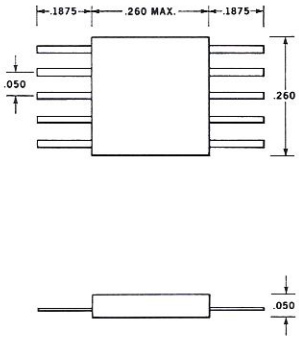




NOTES: Dimensions as per latest J-10 committee
All dimensions in inches
Leads are gold-plated Kovar
Package weight is 1.22 grams

ORDER PART NO.
U5B771031X

PHYSICAL DIMENSIONS
(TYPICAL FLAT PACKAGE)
(TOP VIEW)



ORDER PART NO.
U3H771031X

Notes on page 2

* Planar is a patented Fairchild process.

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ELECTRICAL CHARACTERISTICS ($T_A = +25°C$, $V^+ = 12.0V$, $V^- = -6.0V$ unless otherwise specified)

PARAMETER (see definitions)	CONDITIONS (Note 4)	MIN.	TYP.	MAX.	UNITS
Input Offset Voltage	$R_S \leq 200\Omega$		0.6	2.0	mV
Input Offset Current			0.75	3.0	μA
Input Bias Current			13	20	μA
Voltage Gain		1250	1700		
Output Resistance			200		Ω
Output Sink Current	$\Delta V_{in} \geq 5$ mV, $V_{out} = 0$	2.0	2.5		mA
Response Time [Note 3]			40		ns
The following specifications apply for $-55°C \leq T_A \leq +125°C$:					
Input Offset Voltage	$R_S \leq 200\Omega$			3.0	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S = 50\Omega$, $T_A = 25°C$ to $T_A = +125°C$ $R_S = 50\Omega$, $T_A = 25°C$ to $T_A = -55°C$		3.5 2.7	10 10	μV/°C μV/°C
Input Offset Current	$T_A = +125°C$		0.25	3.0	μA
	$T_A = -55°C$		1.8	7.0	μA
Average Temperature Coefficient of Input Offset Current	$T_A = 25°C$ to $T_A = +125°C$ $T_A = 25°C$ to $T_A = -55°C$		5.0 15	25 75	nA/°C nA/°C
Input Bias Current	$T_A = -55°C$		27	45	μA
Input Voltage Range	$V^- = -7.0V$	±5.0			V
Common Mode Rejection Ratio	$R_S \leq 200\Omega$	80	100		dB
Differential Input Voltage Range		±5.0			V
Voltage Gain		1000			
Positive Output Level	$\Delta V_{in} \geq 5$ mV, $0 \leq I_{out} \leq 5.0$ mA	2.5	3.2	4.0	V
Negative Output Level	$\Delta V_{in} \geq 5$ mV	−1.0	−0.5	0	V
Output Sink Current	$T_A = +125°C$, $\Delta V_{in} \geq 5$ mV, $V_{out} = 0$	0.5	1.7		mA
	$T_A = -55°C$, $\Delta V_{in} \geq 5$ mV, $V_{out} = 0$	1.0	2.3		mA
Positive Supply Current	$V_{out} \leq 0$		5.2	9.0	mA
Negative Supply Current			4.6	7.0	mA
Power Consumption			90	150	mW

NOTES:

(1) Rating applies for case temperatures to +125°C; derate linearly at 5.6 mW/°C for ambient temperatures above +105°C.

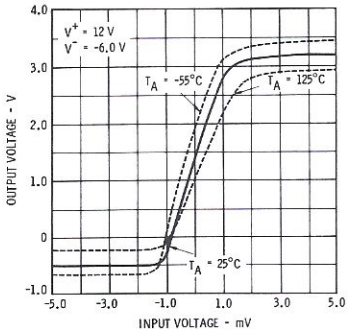
(2) Derate linearly at 4.4 mW/°C for case temperatures above +115°C; derate linearly at 3.3 mW/°C for ambient temperatures above +100°C.

(3) The response time specified (see definitions) is for a 100-mV input step with 5-mV overdrive.

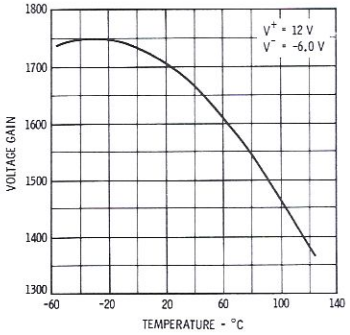
(4) The input offset voltage and input offset current (see definitions) are specified for a logic threshold voltage of 1.8V at −55°C, 1.4V at +25°C and 1.0V at +125°C.

TYPICAL PERFORMANCE CURVES

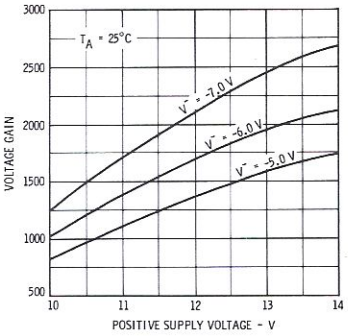
VOLTAGE TRANSFER CHARACTERISTIC



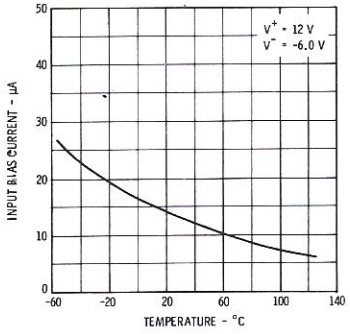
VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



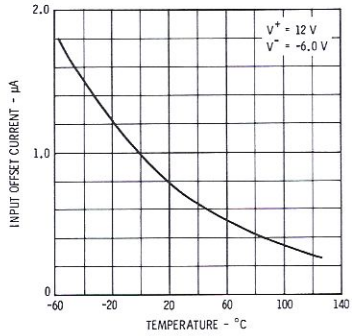
VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGES



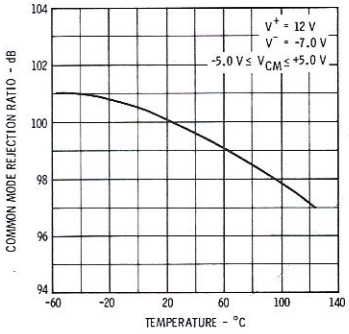
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



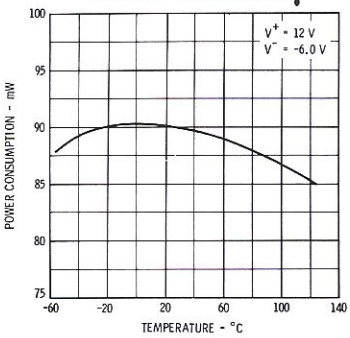
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



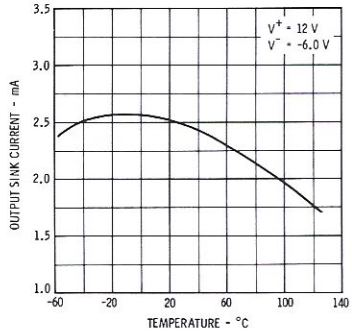
COMMON MODE REJECTION RATIO AS A FUNCTION OF AMBIENT TEMPERATURE



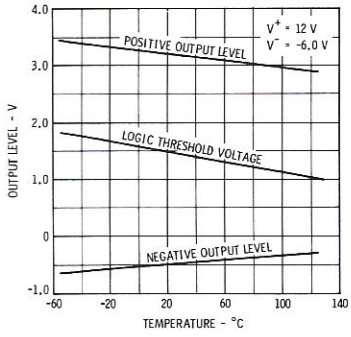
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



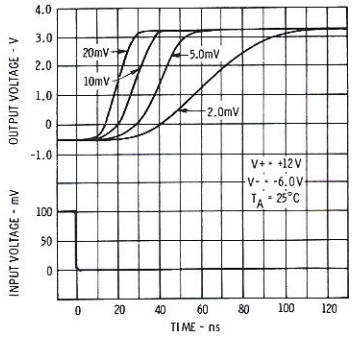
OUTPUT SINK CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



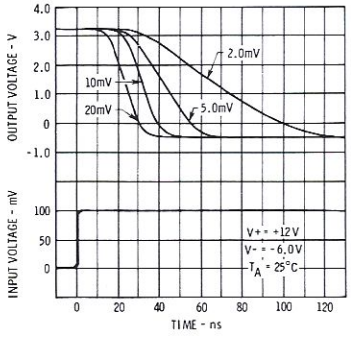
OUTPUT VOLTAGE LEVELS AS A FUNCTION OF AMBIENT TEMPERATURE



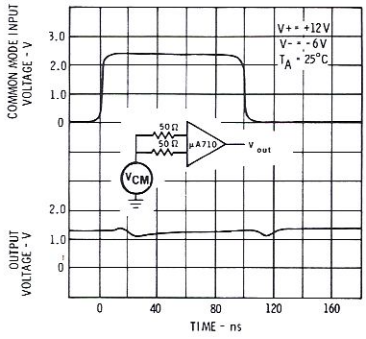
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



COMMON MODE PULSE RESPONSE



DEFINITIONS

LOGIC THRESHOLD VOLTAGE — The approximate voltage at the output of the comparator at which the loading logic circuitry changes its digital state.

INPUT OFFSET VOLTAGE — The voltage between the input terminals when the output is at the logic threshold voltage. The input offset voltage may also be defined for the case where two equal resistances are inserted in series with the input leads.

INPUT OFFSET CURRENT — The difference in the currents into the two input terminals with the output at the logic threshold voltage.

INPUT BIAS CURRENT — The average of the two input currents.

INPUT VOLTAGE RANGE — The range of voltage on the input terminals for which the comparator will operate within specifications.

INPUT COMMON MODE REJECTION RATIO — The ratio of the input voltage range to the maximum change in input offset voltage over this range.

DIFFERENTIAL INPUT VOLTAGE RANGE — The range of voltage between the input terminals for which operation within specifications is assured.

VOLTAGE GAIN — The ratio of the change in output voltage to the change in voltage between the input terminals producing it with the DC output level in the vicinity of the logic threshold voltage.

RESPONSE TIME — The interval between the application of an input step function and the time when the output crosses the logic threshold voltage. The input step drives the comparator from some initial, saturated input voltage to an input level just barely in excess of that required to bring the output from saturation to the logic threshold voltage. This excess is referred to as the voltage overdrive.

POSITIVE OUTPUT LEVEL — The DC output voltage in the positive direction with the input voltage equal to or greater than a minimum specified amount.

NEGATIVE OUTPUT LEVEL — The DC output voltage in the negative direction with the input voltage equal to or greater than a minimum specified amount.

OUTPUT SINK CURRENT — The maximum negative current than can be delivered by the comparator.

PEAK OUTPUT CURRENT — The maximum current that may flow into the output load without causing damage to the comparator.

OUTPUT RESISTANCE — The resistance seen looking into the output terminal with the DC output level at the logic threshold voltage.

POWER CONSUMPTION — The DC power into the amplifier with no output load. The DC power will vary with signal level, but is specified as a maximum for the entire range of input-signal conditions.

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